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STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

2021 Washington State Energy Code Development Energy Code Proposal Short Form

For editorial **Coordination, Clarifications & Corrections** only,
without substantive energy or cost impacts

Code being amended: ☒ **Commercial** Provisions ☐ **Residential** Provisions
(A MS Word version of the code is linked to the name)

Code Section # **Chapter 6, C403.3.5.1, C403.3.6, C406.7**

Brief Description:

This proposal addresses three details associated with the sensible recovery effectiveness requirement for DOAS.

#1 – The 2021 WSEC includes a new definition in Chapter 2 for *sensible recovery effectiveness* based upon the AHRI 1060 Standard. This proposal adds the AHRI 1060 equation for calculating sensible recovery effectiveness into Section C403.3.5.1 Energy recovery ventilation with DOAS and adds references to this equation to all applicable provisions.

#2 - Sensible recovery effectiveness is the basis for compliance with Sections C403.3.5.1 Energy recovery ventilation with DOAS, C403.7.6.1 Ventilation for Group R-2 occupancy and C406.7 High performance dedicated outdoor air system (DOAS). Most small residential and light commercial heat recovery and energy recovery ventilators (H/ERV) with less than 400 CFM capacity are tested and rated in accordance with HVI 920, which applies a similar metric of “adjusted sensible recovery efficiency” (ASRE). This proposal adds an exception to the three applicable sections that allows an ASRE rating to demonstrate compliance with the minimum required sensible recovery effectiveness for small H/ERVs. This aligns with SBCC Official Interpretation #20-14.

#3 – The original intent of the exceptions to C403.3.5.1 Energy recovery ventilation with DOAS was to provide an energy recovery exemption for spaces provided with DCV controls (in alignment with Section C403.7.1 Exception 1) and for applications where energy recovery is prohibited by the International Mechanical Code (IMC). Due to the placement of the DOAS fan power requirements added in the 2018 WSEC, it is unclear whether these exceptions also apply to the DOAS fan power requirements. This proposal moves these exceptions so they follow the energy recovery requirements and are before the fan power requirements, so it is clear these exceptions only apply to the energy recovery requirements of this provision.

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use underline for new text and ~~strikeout~~ for text to be deleted.)

Chapter 6 – Referenced Standards

HVI

Home Ventilating Institute, 1740 Dell Range Blvd., Ste H, PMB 450, Cheyenne, WY 82009

Standard reference number – 920

Title – HVI Publication 920 Product Performance Certification Procedure Including Verification and Challenge

Referenced in code section numbers – C403.3.5.1, C403.3.6

C403.3.5.1 DOAS with energy recovery ventilation with DOAS. The DOAS shall include energy recovery ventilation. The energy recovery ventilation system shall have a 60 percent minimum sensible recovery effectiveness of the energy recovery device as calculated in accordance with Equation 4-X or have 50 percent enthalpy recovery effectiveness in accordance with Section C403.7.6. The airflow rate thresholds in Section C403.7.6 that define when the energy recovery requirements in that section do not apply, are not applicable to this section. The return/exhaust air stream temperature for heat recovery device selection shall be 70°F (21°C) at 30 percent relative humidity, or as calculated by the registered design professional.

~~For DOAS having a total fan system motor nameplate hp less than 5 hp, total combined fan power shall not exceed 1 W/cfm of outdoor air. For DOAS having a total fan system motor hp greater than or equal to 5 hp, refer to fan power limitations of Section C403.8.1. This fan power restriction applies to each dedicated outdoor air unit in the permitted project, but does not include the fan power associated with the zonal heating/cooling equipment. The airflow rate thresholds for energy recovery requirements in Tables C403.7.6(1) and C403.7.6(2) do not apply.~~

$$\text{Sensible recovery effectiveness} = \frac{\text{CFM}_{\text{supply}}(T_{\text{OA}} - T_{\text{SA}})}{\text{CFM}_{\text{exhaust}}(T_{\text{OA}} - T_{\text{RA}})} \quad \text{(Equation 4-X)}$$

Where,

$\text{CFM}_{\text{supply}}$ = Design maximum airflow rate of outdoor (supply) air

$\text{CFM}_{\text{exhaust}}$ = Design maximum airflow rate of exhaust air

T_{OA} = Design outdoor air dry bulb temperature entering the energy recovery device

T_{SA} = Supply air dry bulb temperature leaving the energy recovery device at design temperatures and airflow conditions, as selected for the proposed DOAS unit(s)

T_{RA} = Design return air dry bulb temperature

Exceptions:

1. Occupied spaces with all of the following characteristics: complying with Section C403.7.6, served by equipment less than 5000 cfm, with an average occupant load greater than 25 people per 1000 square feet (93 m²) of floor area (as established in Table 403.3.1.1 of the *International Mechanical Code*) that include demand control ventilation configured to reduce outdoor air by at least 50% below design minimum ventilation rates when the actual occupancy of the space served by the system is less than the design occupancy.
2. Systems installed for the sole purpose of providing makeup air for systems exhausting toxic, flammable, paint, or corrosive fumes or dust, dryer exhaust, or commercial kitchen hoods used for collecting and removing grease vapors and smoke.
3. Heat recovery and energy recovery ventilators (H/ERV) that are rated and listed in accordance with HVI 920 can demonstrate compliance with the sensible recovery effectiveness requirement using the adjusted sensible recovery effectiveness (ASRE) rating of the equipment at 32°F test conditions. Applied flow rate for ASRE rating shall be no less than the design flow rate or the closest value interpolated between two listed flow rates.

[NOTE – Move fan power language to below the exceptions. There are no proposed changes to the fan power language in this proposal, other than relocation.]

For DOAS having a total fan system motor nameplate hp less than 5 hp, total combined fan power shall not exceed 1 W/cfm of outdoor air. For DOAS having a total fan system motor hp greater than or equal to 5 hp, refer to fan power limitations of Section C403.8.1. This fan power restriction applies to each dedicated outdoor air unit in the permitted project, but does not include the fan power associated with the zonal heating/cooling equipment.

C403.3.6 Ventilation for Group R-2 occupancy. For all Group R-2 dwelling and sleeping units, a balanced ventilation system with a heat recovery system ~~with minimum 60 percent sensible recovery effectiveness~~ shall provide outdoor air directly to all habitable spaces. The heat recovery system shall have a 60 percent minimum sensible recovery effectiveness as calculated in accordance with Section C403.3.5.1. The ventilation system shall allow for the design flow rates to be tested and verified at each habitable space as part of the commissioning process in accordance with Section C408.2.2.

Exception: Heat recovery and energy recovery ventilators (H/ERV) that are rated and listed in accordance with HVI

920 can demonstrate compliance with the *sensible recovery effectiveness* requirement using the adjusted sensible recovery effectiveness (ASRE) rating of the equipment at 32°F test conditions. Applied flow rate for ASRE rating shall be no less than the design flow rate or the closest value interpolated between two listed flow rates.

C406.7 High performance dedicated outdoor air system (DOAS). A whole building, building addition or tenant space which includes a DOAS complying with Section C406.6 shall also provide a DOAS with 80 percent minimum *sensible recovery effectiveness* as calculated in accordance with Section C403.3.5.1 ~~of heat recovery of 80 percent~~ and DOAS total combined fan power less than 0.5 W/cfm of outdoor air. For the purposes of this section, total combined fan power includes all supply, exhaust, recirculation and other fans utilized for the purpose of ventilation.

Exception: Heat recovery and energy recovery ventilators (H/ERV) that are rated and listed in accordance with HVI 920 can demonstrate compliance with the *sensible recovery effectiveness* requirement using the adjusted sensible recovery effectiveness (ASRE) rating of the equipment at 32°F test conditions. Applied flow rate for ASRE rating shall be no less than the design flow rate or the closest value interpolated between two listed flow rates.

Purpose of code change:

This proposal incorporates various language updates and content location changes to improve code language clarity.

It incorporates into the body of the code the AHRI 1060 calculation for *sensible recovery effectiveness*, so it is easily referenced. It also allows HVI 920 efficiency ratings for residential and light commercial heat recovery and energy recovery ventilators as an equivalent to standard AHRI 1060 for small equipment, which will align the code language more closely with standard rating conditions.

These changes are not intended to alter existing code stringency.

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